

How Swiss small and medium-sized firms assess the performance impact of mergers and acquisitions

Spyros Arvanitis · Tobias Stucki

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Abstract While previous studies on mergers and acquisitions (M&As) mostly relied on large firms, our study is based on a sample that includes all Swiss M&As that took place in the period 2006–2008, mostly of which have been SMEs. We investigate the firm characteristics that determine the innovation and economic performance of M&As. The performance measures are based on firms' assessments. These measures are regressed on a series of possible determining factors as postulated in existing theoretical and empirical literature. M&A performance is primarily affected by specific M&A characteristics, but not by general market characteristics such as demand development or competition conditions. Rather astonishingly, it is also not affected by firm characteristics such as capital intensity, human capital endowment and firm size. There is an interesting exception: innovation activities. This means that, with the remarkable exception of innovation activities, the level of M&A performance is determined primarily by factors of the M&A process itself.

Keywords Mergers and acquisitions · Economic performance · Innovation performance · Micro-data

JEL classifications L20 · O31 · L26

1 Introduction

There is a broad theoretical and empirical literature on the economic performance of mergers and acquisitions (M&A) (see, e.g., Agrawal and Jaffe 2000; Kaplan 2000; Martynova and Renneboog 2008; Gugler et al. 2012). Nevertheless, some aspects remain under-researched, particularly those that are specific to small and medium-sized firms (SMEs). This neglect of M&A studies that refer to SMEs may be traced back, firstly, to the fact that the majority of empirical studies rely on stock market-based measures of performance (see Bild 1998; King et al. 2004; McDonald et al. 2008; Meglio and Risberg 2011). As such information is not available for the majority of SMEs, the performance of M&As is almost exclusively analyzed for large M&As, and it is unclear whether the implications of these studies are also valid for M&As of SMEs (see Weitzel and McCarthy 2011). Secondly, most previous empirical studies concentrate on the effects of M&As on various aspects of economic performance and rather neglect the investigation of the factors that influence such performance effects. What is needed is more analysis of the factors that determine the performance effects of M&As. King et al. (2004), based on a meta-analysis of M&A

S. Arvanitis (✉) · T. Stucki
KOF Swiss Economic Institute, ETH Zurich, 8092 Zurich,
Switzerland
e-mail: arvanitis@kof.ethz.ch

T. Stucki
e-mail: stucki@kof.ethz.ch

studies, concluded that “what is clearly needed is a better understanding of the conditions under which acquisitions make sense as a path to superior performance” (p. 196).

A further point is that only a limited number of M&A studies focus on the consequences of M&A on the firms’ technological activities (see Veugelers 2005 for a review of this literature). Given the increasing importance of innovation activities as a driver of growth, not only for larger firms but also for SMEs, it becomes clear that more insights with respect to the innovation effects of M&A are needed (see, e.g., Cassiman et al. 2005; Cloudt et al. 2006).

Our study is based on a representative sample including all Swiss M&As that took place in the period 2006–2008. Average size of these firms is about 320 employees, with only 40 % of the firms having more than 100 employees. Accordingly, we are able to draw conclusions regarding the total of M&As in the respective period of time, 86 % of which had less than 500 employees. Further, our study is based on survey data that provide us with detailed information on the determinants of M&A performance. We investigate the firm characteristics that determine the innovation and economic performance of M&A. The performance measures come from survey-based firms’ assessments. These measures are regressed on a series of possible determining factors as postulated in existing theoretical and empirical literature.

Previous empirical studies that deal with the determinants of M&A performance are often based on small sample survey results. Probably most closely related to our work are the studies of Capron (1999) and Cassiman et al. (2005). However, neither study is representative of the M&A population. Furthermore, we analyze the determinants in a more general way. While Capron (1999) focuses on performance effects of asset divestiture and resource redeployment, we have broader information to describe the determinants of M&A performance. Cassiman et al. (2005) exclusively analyzes the impact on the R&D process. Our contribution to empirical literature is that we investigate the determinants of the effects of M&A on both economic and innovation performance based on a sample of (mostly) SMEs.

The paper is organized as follows. Section 2 presents the conceptual background and the research hypotheses that are tested in the empirical part. Section 3 provides a short descriptive analysis of the

data used in the paper. In Sect. 4, the specification of the empirical models is presented. Section 5 deals with the estimation results and Sect. 6 concludes.

2 Conceptual background and hypotheses

The literature referring to the explanation of the performance of M&As can be divided in two broad branches: the value-increasing efficient-market approach and the value-decreasing agency approach. According to the former, mergers occur because of the possibility of exploiting synergies (between the acquiring firm and the target firm), which in turn enhance the performance of the merged firm (see, e.g., Hitt et al. 2001). The latter explains the performance failure of mergers through the existence of informational and agency problems between management and owners (see, e.g., Jensen 1986). For SMEs, we expect that the value-destroying approach will not apply because in most cases there is no separation of ownership and control (Weitzel and McCarthy 2011). In this study, we thus concentrate on the value-increasing efficient-market approach.

The most common theory explaining the possible determinants of M&A performance suggests that firms acquire other firms with some form of relatedness, thereby creating efficiency through synergy (see Harrison et al. 1991, p. 173). Synergy occurs when the combination of two firms involved in a merger or acquisition increases operating efficiency (i.e., it leads to lower cost) and/or effectiveness (i.e., serves a more appropriate allocation of scarce resources, given environmental constraints) (Lubatkin 1983). Reasons for such synergies are economies of scale and/or economies of scope. While economies of scale reduce average cost of production through size, economies of scope are complementarities that make it cheaper to produce goods jointly rather than to produce each of them on its own, for example, by spreading advertising costs across more business units (see, e.g., Seth 1990; Sharma and Ho 2002).

M&A are multifaceted phenomena. Accordingly, many sources of synergies have been suggested to affect M&A performance in the M&A literature. In accordance with this literature, we formulate a model that considers several dimensions of M&A characteristics (see King et al. 2004; Stahl and Voigt 2004; Dutta and Jog 2009 for a survey of literature about the

determinants of M&A performance). The results from model estimation (see Sect. 5) will be interpreted in the light of the hypotheses to be formulated in this section.

2.1 Relative size

The performance of M&As should be related to the relative size of the target firm to bidder. A larger relative size correlates with a larger synergy potential generated, for example, by economies of scale (see Agrawal et al. 1992; Capron 1999). This should hold for research as well as production facilities (Laabs and Schiereck 2010). Furthermore, it is expected that managerial attention is positively correlated with the relative size of the target firm, which in turn may increase the efficiency of synergy realization (see Larsson and Finkelstein 1999). On the other hand, firm size may also increase managerial difficulties (see Dutta and Jog 2009). However, we presume that, on balance, the positive effect of relative firm size weighs more.

H1: The relative size of target firm is positively correlated with the innovation performance as well as economic performance of M&As.

2.2 Degree of integration

Economies of scale and scope through M&A usually arise through asset divestiture (see Capron 1999; Capron et al. 2001). The integration of the target firm provides opportunities for sharing under-utilized assets and for divesting less efficient product lines. Furthermore, the integration of the target firm can enhance innovation performance as it allows focusing on the superior innovation capability (see Bertrand and Zuniga 2006). Such synergistic benefits require, of course, high levels of integration (see Datta 1991).

H2: The higher the degree of integration of the target firm, the higher is the M&A performance (innovation and economic performance).

2.3 Relatedness

Unrelated M&As are less likely to succeed because managers of the acquiring firm are not familiar with the target industry (see Agrawal et al. 1992; Sharma and Ho 2002; Dutta and Jog 2009). Benefits from

economies of scope and scale are expected to be higher in M&As, in which a relationship exists between the acquiring and the target firm (operating in related industries with similar or complementary products; technological proximity) (see Singh and Montgomery 1987). In accordance with Cassiman et al. (2005), we distinguish two types of relatedness: *market-relatedness* that refers to the proximity as to the product markets in which firms are operating, and *technology-relatedness* that is associated with the proximity of the firms' knowledge endowment.

We expect both market-relatedness and technology-relatedness to be positively correlated with economic performance of M&As. The impact on innovation performance has to be analyzed in a more differentiated way (see Cassiman et al. 2005). Because of economies of scope, technology-relatedness due to *complementary* technologies would positively affect innovation performance. When merged firms are technologically *substitutive* (because of similar technologies), it is expected that, e.g., R&D expenditures (in the sum) would decrease. This is due to the elimination of common inputs and lack of (or only small) efficiency gains of the common R&D organization.

The expected main effect of market-relatedness is to realize economies of scale, both through specialization and elimination of duplication. Innovation is not the main motivation for such activities and may thus be negatively affected (see Cassiman et al. 2005).

H3: Both the degree of market-relatedness and the degree of technology-relatedness are positively correlated with the economic performance of M&As.

H4a: The degree of market-relatedness is negatively correlated with innovation performance of M&As.

H4b: Complementary (substitutive) technology-relatedness is positively (negatively) correlated with innovation performance.

2.4 External versus internal acquisition

If the firms belonged to the same group of companies before the transaction took place, it can be expected that the group would have already taken advantage of potential synergies between the firms. Accordingly, the potential for additional synergies would be small in case of internal acquisitions. On the other hand, the problem of cultural differences is of minor relevance in

case of internal acquisitions. Cultural differences, for example, with respect to work-related values and management style are likely to lead to employee resistance and major integration problems in external acquisitions. Accordingly, it is expected that cultural differences would have a negative effect on M&A performance (see Cartwright and Cooper 1996; Stahl and Voigt 2004; Teerikangas and Very 2006). Culture is a specific characteristic of organizations and may differ considerably across firms (see Datta 1991). The negative impact of cultural differences is thus expected to be smaller for M&As within the same group of companies (internal acquisition) than for external acquisitions. However, we presume that, in sum, the advantages of cultural similarity cannot compensate for the smaller synergy potential of internal acquisitions compared with external acquisitions.

H5: Internal acquisitions are less likely to generate a positive M&A performance (innovation and economic performance) than external acquisitions.

2.5 Internal versus external financing

According to the free cash flow theory (see, e.g., Jensen 1986), M&A performance and the method of payment for the M&A should be strongly related. Increased financial leverage for M&A activities increases management's focus on debt repayment and cost reduction, and limits freedom to use future cash flows. While increased efficiency should positively affect economic performance (see Sharma and Ho 2002), increased focus on immediate cash flows may reduce R&D intensity (see Long and Ravenscraft 1993; Cassiman et al. 2005; Bertrand 2009). We test such effects by including a variable that measures whether the M&A is mainly *equity-financed*.

H6: Equity-financed M&As show a higher economic and innovation performance than debt-financed M&As.

3 Description of the data

3.1 Construction of the dataset

The sample we use in this study refers to the cohort of Swiss M&As that existed between 2006 and 2008. This cohort was registered by the Swiss Federal

Statistical Office and originally contained 2,048 firms. We checked in detail the original data in a multi-step process. In a first step, the changes in the firm structure of *acquiring* firms were verified using the information of the Swiss Commercial Register. A further verification whether these (legal) changes corresponded to real M&A activities was attained through specific questions in the questionnaire that was addressed to the acquiring firms. A total of 413 firms of the original sample were excluded because (1) the registered M&As were only legal adaptations to already established economic relations; (2) they were non-profit organizations; and (3) they were firms with less than one full-time employee. Further, 237 firms have already left the market in 2011 and could not be contacted anymore. After these adjustments 1,398 were left in the sample that corresponded to our definition of M&A. We defined M&A as the partial or full merger or acquisition of firms that are legally independent from each other. This definition covers both external M&As and M&As within the same group of firms (internal M&As).

The data have been collected in the course of a postal survey on the "M&A of the Swiss Economy" carried out in spring 2011. The available data are to a high extent qualitative in nature (nominal or ordinal measures). The part dealing with the characteristic of the M&A is strongly inspired from the two surveys used in Capron (1999) and Cassiman et al. (2005), respectively. The survey yielded information on general M&A characteristics (number of M&A per acquiring firm, relative size, method of payment, relatedness, etc.), the degree of integration of M&A, motives for and obstacles to M&A, and the effect of M&As on different performance measures. If more than one transaction took place in the period 2006–2008 within the same firm, firms were asked to make average statements. In addition, we collected information on innovative activities and some basic characteristics of the firm (sales, value added, employment, firm age, industry affiliation, etc.).¹

The survey yielded data for 405 enterprises, implying a response rate of 29 %. This is satisfactory given the very demanding questionnaire and that not all 'wrong' M&As could be identified in advance. Due to missing values for some of the model variables,

¹ The questionnaire is available in German and French on www.kof.ethz.ch/en/surveys/.

only about 300 observations could be used for model estimation. Table 1 presents information on the sample composition by sector, industry, and firm size class.

3.2 Measurement of performance

3.2.1 Indicators

M&As are complex and multidimensional (see Meglio and Risberg 2011). Accordingly, we use several indicators to measure performance. Our measures of M&A performance are based on self-reported data ('perceptual measures'). Self-reported data have been extensively used in the literature, and also for measuring the impact of M&A on performance (e.g., Datta 1991; Capron 1999; Cassiman et al. 2005; for an overview, see Meglio and Risberg 2011). Self-reported measures carry some methodological limitations as they are qualitative and to some extent subjective. However, self-reported data have some important features, as 'objective' measures are unlikely to allow the isolating of the impact of the M&A from other exogenous variables (see Capron 1999; Cassiman et al. 2005). This is basically the case for two reasons. Firstly, 'objective' measures such as accounting data are typically available in aggregated form only and do not allow the identification of the effect of a specific transaction. Secondly, the time lag of the impact of M&A is larger for 'objective' measures. Accordingly, it is hardly possible to identify such effects 3–5 years after the transaction.

In the survey, 2–5 years after the M&A,² firms were asked to report on a five-level Likert scale the impact of the M&A on six different performance measures ("How did the M&A affect the following measures: (1) market share, (2) sales, (3) profitability, (4) intensity of R&D expenditures, (5) number of patent applications, and (6) share of sales of new products.""). While the questions (1) to (3) deal with economic performance, questions (4) to (6) are proxies for innovation performance.

² The M&A took place in the period 2006–2008, our survey at the beginning of 2011 and was referring to firm activities until the end of 2010. Given that M&As were (almost) equally distributed in the period 2006–2008, the assessments of the impact of M&As refer on average to about 3.5 years *after* M&A. We assume that 3.5 years would be sufficient adaptation time for SMEs.

3.2.2 Performance of M&As

Table 2 shows the firms' responses for all six measures. A (small) majority of acquiring firms reported an increase of sales and/or market share as a consequence of M&A (53 and 63 %, respectively.³ Only 2–3 % of the firms recorded a decrease. The rest could not detect any impact (44 and 34 %, respectively). The outcomes with respect to profitability are slightly different. Almost 10 % of the firms reported a decrease of profitability and about 45 % either no change or an increase.

The situation is quite different with respect to innovation performance (about 59 % of the acquiring firms reported innovation activities in the period 2008–2010). For all three indicators (R&D expenditures, patent applications and sales shares of new products), the dominant result was that no effect could be traced back to M&A (73–91 %). Less than 10 % reported a decrease. Even fewer reported an increase, with the notable exception of the indicator 'sales share of new products'.

Our questionnaire also includes information on the development of objective measures (sales, value added, innovation expenditures) after the M&A, specifically for the period 2008–2010. In alternative estimates not presented here, we compared the results for objective and subjective measures. Given the discussion above, it is no surprise that the impact of M&A characteristics on the development of objective measures was low. Thus, self-reported data seem to be more appropriate to analyze the impact of M&As on performance in our case.

3.3 Characteristics of the M&As

As we have seen in the previous section, our sample of M&As seems to be representative for the entire population of Swiss M&As in the period 2006–2008. Accordingly, the characteristics of these M&As

³ One may argue that a simple addition of the sales (or market shares) of the acquiring and the acquired firm would always lead to an increase of the sales (or market share) from the point of view of the acquiring firm, even without any synergy effects. Of course we cannot exclude this case. But the findings do not seem to show in this direction: a significant share of the acquiring firms reported no impact or even decrease (market share: 46 %; sales: 36 %; see Table 2). Similar considerations apply also to the indicators for innovation performance.

Table 1 Sample composition by sector, industry and firm size

	<i>n</i>	Percentage
Industry/sector		
Manufacturing	106	27
High-tech manufacturing	51	13
Low-tech manufacturing	55	14
Food, beverage, tobacco	9	2
Textiles	3	1
Clothing, leather	0	0
Wood processing	3	1
Paper	3	1
Printing	16	4
Chemicals	8	2
Plastics, rubber	2	1
Glass, stone, clay	4	1
Metal	0	0
Metalworking	9	2
Machinery	23	6
Electrical machinery	6	2
Electronics, instruments	8	2
Watches	3	1
Vehicles	4	1
Other manufacturing	3	1
Energy	2	1
Construction	30	8
Services	257	65
Modern services	129	33
Traditional services	128	32
Wholesale trade	57	15
Retail trade	18	5
Hotels, catering	7	2
Transport, telecommunication	24	6
Banks, insurance	60	15
Real estate, leasing, computer services	14	4
Computer services	21	5
Business services	44	11
Personal services	2	1
Education	2	1
Health, veterinary and social work	0	0
Sewage and refuse disposal, sanitation and similar activities	2	1
Recreational, cultural and sporting activities	6	2
Total	393	100
Firm size		
1–9 employees	53	13
10–19 employees	32	8

Table 1 continued

	<i>n</i>	Percentage
20–49 employees	88	22
50–99 employees	66	16
100–499 employees	106	26
500 and more employees	58	14
Total	403	100

Firm size information is based on information for the year 2010. Due to different response rates, the number of observations differs between variables

should tell us something about how average M&As look like. Detailed descriptions of the collected data are presented in Tables 1, 2, and 3.

Most of the M&As took place in the service sector (65 %), 27 % in the manufacturing sector, the remaining 8 % in the construction sector. In the service sector as well as in the manufacturing sector, M&As were equally distributed among sub-sectors (high-tech vs. low-tech; knowledge-intensive vs. traditional services). M&As were also equally distributed among industries. Only the industries ‘wholesale’, ‘banks, insurance’ and ‘business services’ had a share of more than 10 % of the total sample.

The acquiring firms were for the most part small firms: 60 % of the firms had fewer than 100 employees and only 14 % of the firms employed more than 500 employees. The relative size of the target to acquirer was mostly small. The sales of the target firm made less than 5 % of the acquirer’s sales in nearly 30 % of all M&As. The target firm was larger than the acquiring firm in only 1 % of all transactions.

Most of the targets have been totally integrated in the existing firm after the acquisition (89 %). Furthermore, most acquisitions referred to firms with some degree of relatedness: 59 % had substitutive technologies, 35 % complementary technologies, 39 % were market-related, and 54 % even belonged to the same group of companies.

M&As were mostly motivated by growth- and cost-related objectives. The most important motive was the objective to increase the market share (61 %), followed by the motives to obtain access to networks (44 %), spread fixed costs (43 %), and entry into new businesses (42 %). Innovation-related motives were for most firms of minor importance. This may partially be explained by the fact that most firms in our sample are quite small and innovation activities are of small

Table 2 Descriptive information on M&A performance

	Percentage decrease	Percentage no impact	Percentage increase
<i>M&A performance: share of firms with a certain assessment of the impact of the M&A on a specific performance measure</i>			
Economic performance			
Market share	2	44	53
Sales	3	34	63
Profitability	9	45	46
Innovation performance			
Intensity of R&D expenditures	8	87	5
Number of patent applications	7	91	3
Share of sales of new products	6	73	21

importance. However, the importance of innovation objectives does not increase significantly, when we observe only firms with R&D activities.

Most M&As were only marginally affected by the obstacles listed in our survey. The most important obstacles were limited management capacities (14 %), linguistic/cultural differences (10 %), and the (unfavorable) development of the market demand (10 %).

4 Econometric framework

4.1 Dependent variable

As mentioned in Sect. 3.2, our dataset includes information on different indicators of economic as well as innovation performance of M&As. With respect to economic performance, we have information on the impact on (1) market share, (2) sales, and (3) profitability. Effects with respect to the innovation performance are measured by the impact on (1) R&D intensity, (2) the number of patent applications, and (3) the share of sales of new products.

The impact of M&As on all six performance measures has been assessed by the firms on a five-point Likert scale (1: ‘strong decrease’; 5: ‘strong increase’). To be able to investigate the impact of both dimensions of performance as a whole, we calculated overall measures for both types of performance. In order to test the robustness of the overall dependent

variables, we constructed two alternative measures for economic performance and two alternative measures for innovation performance. The exact construction of these measures is described in Table 4. All constructed measures were binary variables.⁴ We estimated our model for economic performance and innovation performance separately for both versions of the overall variable, as well as for each of the single measures for economic and innovation performance.

To explain M&A performance, we took into consideration all the determinants discussed in Sect. 2. We use the same specification for both performance variables. To take into account the binary character of the dependent variables, we estimate probit models.

4.2 Specification of the empirical model

4.2.1 Basic model

Our specification concept is based on the framework of an expanded production function. The model contains the indirect measures of (possible) M&A synergies (*relative size*; *total integration*; *substitutive technologies*; *complementary technologies*; *market related*; *internal acquisition*; for a detailed definition of the variables and descriptive statistics, see Tables 4, 8, respectively) that refer to the hypotheses H1–H5. We test H6 using the variable (*equity-financed*).

Furthermore, we include a variable that would capture effects on M&A performance that are not directly related to synergy effects. The M&A performance may depend on the point of time, on which it is measured (see Meglio and Risberg 2011). As the point in time varies in our sample, a variable controls for the point in time the M&A took place (*integration date*).

Our model also contains controls for market conditions (demand development; price and non-price competition), innovation activities (only for economic performance), human resources, capital input and independency of the firm. Furthermore, we controlled for firm size (*size*) and sector affiliation (*sector affiliation*).

⁴ We have also tested alternative dependent variables that allow distinguishing different levels of performance effects (ordinal overall variables). However, the respective ordered probit estimates differ only marginally from the probit estimates based on the binary variables and yielded no additional insights.

Table 3 Descriptive information on M&A characteristics

	Percentage of firms
Relative size of target to acquirer (in % of annual sales)	
≤5	29
6–25	37
26–50	24
51–100	8
>100	1
Total	100
Integration and relatedness	
Total integration of the target firm in the existing firm	89
The target and the acquiring firm operated in the same market (same industry, product and market)	39
The target and the acquiring firm had substitutive technologies	59
The target and the acquiring firm had complementary technologies	35
The target and the acquiring firm belonged to the same group of companies	54
Motives: share of firms assessing a specific objective as important (value 4 or 5 on a 5-point scale) for M&A	
Growth	
Increase market share in the existing business of the acquiring firm	61
Broaden the product mix of the existing business of the acquiring firm	31
Entry into businesses that were new to the acquirer	42
Costs	
Spread fixed costs of production over larger output	43
Rationalization of procurement	31
Rationalization of production	27
Rationalization of marketing and sales	37
Resources	
Obtain access to specific know-how in production	25
Obtain access to specific know-how in distribution	22
Obtain access to networks (customers, supplier)	44
Risks	
Spread the market risk	24
Innovation	
Reduce costs of R&D	7
Obtain access to innovation related know-how	15
Obtain access to innovation related networks (e.g., universities)	6
Reduce the risks of the R&D portfolio	5
Reduce the risk of being imitated	7
Get competing technologies under control	8
Obstacles: share of firms assessing a specific obstacle as important (value 4 or 5 on a 5-point scale)	
Distance	
Large geographical distance	5
Linguistic/cultural differences	10
Lack of synergies	7
Coordination	
Insufficient management capacity	14
High costs of coordination	9
Inconsistent objectives	7

Table 3 continued

	Percentage of firms
Financing	
Insufficient availability of internal capital	6
Insufficient availability of external capital	6
Market	
Development of the market demand	10

4.2.2 Extended model

Besides the information on general M&A characteristics and performance, our dataset also includes information on motives for M&As and M&A-related obstacles. This information was also exploited in our analysis.

The use of the *motive* variables as additional right-hand variables in our model allows the investigation of the degree of attainment of the objectives that firms pursued with respect to M&A. Positive (negative) correlations with the performance variables would indicate that objectives and outcomes are (not) congruent. Particularly, we expect that ‘cost-oriented’ motives correlate positively primarily with economic performance, ‘innovation-oriented’ primarily with innovation performance, and market-oriented motives with both performance measures.

The use of the *obstacle* variables allows some additional insights on the possible problems that might explain weak performance outcomes. We expect negative effects of these variables on both performance measures.

The respective data refer to 17 single motives and 9 obstacles, respectively, the importance of which has been assessed by the firms on a five-point Likert scale. Using principal component factor analysis of the single motives, we identified three groups of motives (see Table 11 in the appendix for detailed information on the individual motives and the factor matrix). Factor 1 stands for innovation-oriented motives (*innovation motive*). Factor 2 refers to market extension motives (*market motive*). Factor 3 represents cost reduction motives (*cost motive*). The three ‘motive variables’ extracted by factor analysis are added to the explanatory variables of our basic model.

The same procedure was used for the obstacle variables. Based on principal component factor analysis, we identified two groups of obstacles (see Table 12). Factor 1 depicts organizational obstacles

(*organizational obstacle*) such as geographical distance, linguistic/cultural differences or inconsistent objectives. Factor 2 captures financial constraints (*financial obstacle*). Both factors are added to the variables of our basic model.

The analysis is based on cross-sectional data (see Sect. 3). Therefore, the potential problem of endogeneity cannot be solved. As a consequence, we have to be cautious in interpreting the results. Hence, we refrain from making causal claims, but rather interpret the estimated coefficients as partial correlations. Nevertheless, the coefficients show whether and to what extent the results are in line with the hypotheses postulated in Sect. 2.

Finally, as one can see in the correlation matrix in Table 9 in the appendix, the results are also not driven by multicollinearity.

5 Estimation results

5.1 Basic model

The cross-section character of our data does not allow a causal interpretation of our results. Thus, we interpret them as correlations, which would indicate a degree of accordance with our hypotheses, if the estimated effects show in the same direction as the hypotheses.

The results of the probit estimates are reported in Tables 5 and 6.⁵ Columns 1–3 of Table 5 show the results for the two versions of the overall variable of

⁵ We also estimated a bivariate model for economic performance (after dropping the variable “innovation activities”) and innovation performance in order to capture the effects of interdependence between these variables possibly driven by some unobserved heterogeneity, as a referee suggested. The results were practically the same as in the separate probit estimates presented in Table 5 so we refrain from presenting them here.

Table 4 Variable definition and measurement

Variable	Definition/measurement
Dependent variables	
Economic performance I	Measure I is a binary variables takes the value 1 if a firm reports an increase of performance (due to M&A) for one of the three single performance indicators (values 4 or 5 on a five-level Likert scale—1: ‘strong decrease; 5: ‘strong increase’; see below), and 0 otherwise
Economic performance II	Measure II is a binary variable, which is constructed as follows: based on the average of the scores of the three single performance indicators (five-level Likert scale—1: ‘strong decrease; 5: ‘strong increase’; see below) this binary variable takes the value 1 if the average score is equal or higher than 4 (increase or strong increase), and 0 otherwise
Market share	Binary variable that takes the value 1 if a firm reports an increase of <i>market share</i> due to M&A (values 4 or 5 on a five-level Likert scale—1: ‘strong decrease; 5: ‘strong increase’)
Sales	Binary variable that takes the value 1 if a firm reports an increase of <i>sales</i> due to M&A (values 4 or 5 on a five-level Likert scale—1: ‘strong decrease; 5: ‘strong increase’)
Profitability	Binary variable that takes the value 1 if a firm reports an increase of <i>profitability</i> due to M&A (values 4 or 5 on a five-level Likert scale—1: ‘strong decrease; 5: ‘strong increase’)
Innovation performance I	Measure I is a binary variables takes the value 1 if a firm reports a positive increase of overall innovation performance due to M&A (values 4 or 5 on a five-level Likert scale—1: ‘strong decrease; 5: ‘strong increase’) for one of the three single innovation indicators (see below), and 0 otherwise
Innovation performance II	Measure II is a binary variable, which is constructed as follows: based on the average of the scores of the three single innovation indicators (five-level Likert scale—1: ‘strong decrease; 5: ‘strong increase’; see below) this binary variable takes the value 1 if the average score is equal or higher than 4 (increase or strong increase), and 0 otherwise
R&D intensity	Binary variable that takes the value 1 if a firm reports an increase of <i>R&D intensity</i> due to M&A (values 4 or 5 on a five-level Likert scale—1: ‘strong decrease; 5: ‘strong increase’)
Patent applications	Binary variable that takes the value 1 if a firm reports an increase of the <i>number of patent applications</i> due to M&A (values 4 or 5 on a five-level Likert scale—1: ‘strong decrease; 5: ‘strong increase’)
New product share	Binary variable that takes the value 1 if a firm reports an increase of <i>shares of sales of new products</i> due to M&A (values 4 or 5 on a five-level Likert scale—1: ‘strong decrease; 5: ‘strong increase’)
Independent variables	
M&A synergy	
Relative size	Relative size of annual sales of target to acquirer; natural logarithm
Total integration	Total integration of the target firm in the acquiring firm yes/no (reference group: partial or no integration)
Substitutive technologies	The target and the acquiring firm had related technologies yes/no
Complementary technologies	The target and the acquiring firm had complementary technologies yes/no
Market related	The target and the acquiring firm operated in the same market (same industry, product and market) yes/no
Internal acquisition	The target and the acquiring firm belonged to the same group of companies yes/no
Other M&A characteristics	
Integration date	Point in time when the transaction took place [differentiated by month; variable ranging from 1 (January 2006) to 36 (December 2008)]
Equity financed	M&A was mainly equity-financed yes/no
Control variables: based on information after M&A	
Demand development	Development of a firm’s specific product demand in the past 3 years (2008–2010): binary variable that takes the value 1 if a firm reports an increase I demand (values 4 or 5 on a five-point Likert scale—1: ‘strong decrease; 5: ‘strong increase’), and 0 otherwise

Table 4 continued

Variable	Definition/measurement
Price competition	Intensity of price competition: binary variable that takes the value 1 if a firm reports an increase I demand (values 4 or 5 on a five-point Likert scale—1: ‘strong decrease’; 5: ‘strong increase’), and 0 otherwise
Non-price competition	Intensity of non-price competition: binary variable that takes the value 1 if a firm reports an increase I demand (values 4 or 5 on a five-point Likert scale—1: ‘strong decrease’; 5: ‘strong increase’), and 0 otherwise
Investment intensity	Gross investment per employee (2010), natural logarithm
Tertiary share	Share of employees with a tertiary-level degree
Innovation activities	Development and introduction of product innovation yes/no (2008–2010)
Independent	Firm is not part of a group of companies yes/no
Firm size	Number of employees (2010); natural logarithm
High tech manufacturing	Binary variable for firms belonging to NACE 19, 20–22; 26–30
Low tech manufacturing	Binary variable for firms belonging to NACE 10–18; 23, 24, 25, 31–33, 35–39
Modern services	Binary variable for firms belonging to NACE 53, 61, 58–60; 62, 63, 64–66; 69–74; 78, 80, 82
Traditional services	Binary variable for firms belonging to NACE 45–47; 95 49–52; 79, 55, 56, 68, 77, 81, 96
Motives	
Innovation motive; market motive; cost motive	Factor scores of motives for M&As (see Table 12 in the appendix)
Obstacles	
Proximity organizational obstacle; financial obstacle	Factor scores of obstacles (see Table 12 in the appendix)

economic performance, and columns 4–6 the estimates for the three single indicators of economic performance. Table 6, which presents the results for the innovation equation, is similarly structured.

The relative size of target to acquirer is positively correlated with economic as well as innovation performance of M&As. Thus, hypothesis H1 cannot be rejected. Furthermore, in line with hypothesis H2, we find that the full integration of the target firm in the existing firms does positively correlate with both M&A performance measures.

Most other studies report similar results. A positive effect of relative size of the acquired firm on the long-term performance was also found by Dutta and Jog (2009) based on data for 1,300 Canadian M&As in the period 1993–2002. In an earlier study based on 253 M&As of large European and US firms in the period 1988–1992, Capron (1999) also found positive effects of relative size on measures of both economic and innovation performance. No such effect was found by Sharma and Ho (2002) in a study based on a sample of 36 Australian M&As in the period 1986–1991, or by Datta (1991) in a study of 173 US manufacturing firms in the period 1980–1984.

Rather unexpectedly, the effect of market-relatedness on economic performance is positive but not statistically significant. Also, the coefficients of the two variables for technology-relatedness are not significant in the equations for economic performance.

The underlying reasoning of hypothesis H3 is that unrelated M&As face larger obstacles as they are not familiar with each other’s businesses. In the case of economic performance, such obstacles should in a first step affect production costs, and only in the long run affect other performance measures. Accordingly, we would expect that relatedness does primarily affect a firm’s profitability and not the development of the market share and sales. Some supportive evidence for this argumentation can be found at least for market-relatedness. In estimates of the model separately for the individual performance indicators, we find that market-relatedness is *significantly positive correlated* with profitability (column 6 in Table 5). For the other performance indicators, no significant effect can be observed. Thus, hypothesis H3 is partly rejected.

In line with hypothesis H4a, market-relatedness shows a negative effect on the innovation performance of the M&As. The realization of potential efficiency

Table 5 Probit estimates of economic M&A performance; basic model (average marginal effects)

Dependent variable	Economic performance I	Economic performance II	Economic performance II	Market share	Sales	Profitability
M&A synergy						
Relative size	0.086*** (0.017)	0.097*** (0.017)	0.098*** (0.017)	0.095*** (0.018)	0.100*** (0.018)	0.074*** (0.022)
Total integration	0.148** (0.063)	0.172** (0.068)	0.172** (0.069)	0.259*** (0.077)	0.168** (0.074)	0.056 (0.087)
Substitutive technologies	0.054 (0.047)	0.045 (0.052)	0.034 (0.052)	−0.020 (0.054)	0.064 (0.053)	−0.056 (0.061)
Complementary technologies	0.027 (0.050)	−0.013 (0.052)	0.004 (0.052)	−0.029 (0.055)	0.030 (0.054)	0.057 (0.059)
Market related	−0.034 (0.050)	0.005 (0.056)	0.000 (0.056)	0.097 (0.058)	−0.081 (0.057)	0.131** (0.064)
Internal acquisition	−0.175*** (0.046)	−0.158*** (0.048)	−0.163*** (0.048)	−0.275*** (0.047)	−0.251*** (0.048)	−0.029 (0.057)
Other M&A characteristics						
Integration date	−0.002 (0.002)	0.000 (0.002)	0.000 (0.003)	0.002 (0.003)	−0.003 (0.003)	0.003 (0.003)
Equity financed	0.071 (0.065)	0.052 (0.069)	0.046 (0.072)	0.063 (0.073)	0.196*** (0.067)	0.114 (0.082)
Control variables						
Demand development	0.085* (0.046)	0.059 (0.049)	0.088* (0.047)	0.125** (0.050)	0.147*** (0.049)	−0.026 (0.058)
Price competition	0.018 (0.045)	0.066 (0.048)	0.067 (0.048)	0.076 (0.051)	0.061 (0.049)	0.008 (0.058)
Non price competition	−0.025 (0.044)	−0.026 (0.046)	−0.017 (0.046)	−0.045 (0.048)	−0.033 (0.047)	−0.019 (0.055)
Investment intensity	0.010 (0.009)	0.007 (0.009)	0.008 (0.010)	0.002 (0.010)	0.018* (0.010)	−0.004 (0.013)
Tertiary share	−0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	−0.001 (0.001)	0.000 (0.001)	−0.002* (0.001)
Innovation activities	0.110** (0.048)	0.128** (0.051)		0.094* (0.052)	0.099* (0.051)	0.087 (0.060)
Independent	0.097** (0.043)	0.080* (0.046)	0.087* (0.046)	0.120** (0.047)	0.068 (0.047)	0.028 (0.055)
Firm size	0.011 (0.013)	0.013 (0.014)	0.022 (0.014)	0.021 (0.015)	−0.010 (0.015)	0.010 (0.017)
High tech manufacturing	0.001 (0.104)	−0.112 (0.112)	−0.019 (0.104)	−0.112 (0.120)	0.033 (0.114)	0.039 (0.136)
Low tech manufacturing	−0.011 (0.097)	−0.069 (0.105)	−0.016 (0.102)	−0.053 (0.112)	0.028 (0.108)	0.078 (0.124)
Modern services	0.052 (0.085)	−0.012 (0.094)	0.038 (0.092)	0.025 (0.103)	0.046 (0.097)	0.062 (0.114)
Traditional services	0.067 (0.086)	−0.013 (0.096)	0.039 (0.092)	0.004 (0.102)	0.152 (0.096)	0.136 (0.113)

Table 5 continued

Dependent variable	Economic performance I	Economic performance II	Economic performance II	Market share	Sales	Profitability
<i>N</i>	322	318	319	320	322	320
Wald χ^2	53.36***	50.83***	49.63***	83.03***	70.05***	28.15
Pseudo R^2	0.17	0.16	0.15	0.20	0.19	0.08

See Table 4 for the variable definitions; standard errors are in parentheses under the coefficients

***, **, * denote statistical significance at the 1, 5 and 10 % test levels, respectively

gains seems to distract firms from innovation activities. Additional evidence from the estimates for the single indicators shows that the negative effect of the market-relatedness can be traced back to the sales share of new products (column 5 in Table 6).

The coefficient of the variable for complementary technology-relatedness is positive but not statistically significant, that of the variable for substitutive technology-relatedness is negative and statistically significant. Thus, hypothesis H4b is partly rejected. The negative effect of substitutive technology-relatedness is related primarily with the single indicators number of patent applications and sales share of new products (columns 4 and 5 in Table 6).

The evidence from similar studies is mixed. Capron (1999), Sharma and Ho (2002), and Dutta and Jog (2009) found no effect of (market-)relatedness on the economic performance of M&As. An older study by Singh and Montgomery (1987) based on 105 US firms in the period 1975–1980 found a positive effect of market-relatedness on the profitability of M&As. Cassiman et al. (2005) reported a negative effect of market-relatedness, a positive effect of complementary technology-relatedness, and a negative effect of substitutive technology-relatedness on innovation performance. However, their statistical base of the data of 31 firms is rather narrow. In this sense, our results provide evidence in favor of H4 on a considerably broader basis.

The economic M&A performance is negatively related to internal acquisitions (primarily associated with the single indicators market share and sales; columns 4 and 5 in Table 5). The effect on innovation performance is not statistically significant. A possible explanation may be that the realization of synergies in innovation requires a higher level of integration and that just belonging to the same group of companies is not sufficient to realize synergies in innovation. Accordingly, in the case of internal acquisitions, more synergy potential might be available with respect to innovation performance than

with respect to economic performance. Hypothesis H5 cannot be rejected for economic performance, but is rejected for innovation performance.

The variable for equity-financing of M&As shows, in the equation for economic performance, the expected positive sign, but the respective marginal effect is statistically insignificant. However, a significantly positive effect is found for sales (column 5 in Table 5). Seemingly contrary to our expectations (H6), we find a negative correlation of equity-financed M&A with the measure for innovation performance, primarily stemming from the indicator sales share of new products (column 5 in Table 6). This means that firms that report a high innovation performance due to M&A at the same time report that the M&A was externally financed. A more detailed analysis showed that this effect can be traced back primarily (but not exclusively) to larger firms, which in general have an easier access to external finance (see Table 10 in the appendix). Thus, a possible ex-post explanation could be that larger firms that have good access to external financing may be able to finance externally not only M&A but also innovation projects. In this sense, this finding indicates to a limited validity of H6. Furthermore, Weitzel and McCarthy (2011) argue, and also show empirically, that in general SMEs use more stock (external financing) and less cash as means of payment than larger firms. This could be an alternative explanation of our result, if we assume that many firms understand under external financing not only bank debt but also equity.

In general, one would expect that the process of acquisition needs some time. Accordingly, the time since acquisition and the judgement of the M&A performance should be positively correlated. However, in our data, we cannot observe such an effect. The point of time of M&A affects neither economic nor innovation performance.

The M&A performance is only marginally affected by market conditions and general firm characteristics

Table 6 Probit estimates of innovation M&A performance; basic model (average marginal effects)

Dependent variable	Innovation performance I	Innovation performance II	R&D intensity	Patent applications	New product share
M&A synergy					
Relative size	0.078*** (0.017)	0.062*** (0.016)	0.006 (0.010)	0.008 (0.007)	0.078*** (0.017)
Total integration	0.147** (0.072)	0.184** (0.070)		0.038 (0.026)	0.147** (0.069)
Substitutive technologies	−0.118** (0.049)	−0.125*** (0.046)	−0.041 (0.029)	−0.027** (0.015)	−0.100** (0.048)
Complementary technologies	0.045 (0.049)	0.058 (0.046)	0.042 (0.029)	−0.036* (0.021)	0.032 (0.046)
Market related	−0.099* (0.055)	−0.119** (0.053)	−0.014 (0.033)	−0.001 (0.019)	−0.110** (0.053)
Internal acquisition	−0.053 (0.049)	−0.037 (0.046)	0.013 (0.028)	0.005 (0.018)	−0.075 (0.046)
Other M&A characteristics					
Integration date	−0.002 (0.002)	−0.003 (0.002)	0.002 (0.001)	−0.000 (0.001)	−0.003 (0.002)
Equity financed	−0.240*** (0.059)	−0.217*** (0.056)	0.054 (0.045)	−0.024 (0.021)	−0.226*** (0.055)
Control variables					
Demand development	0.086* (0.049)	0.032 (0.045)	0.032 (0.027)	−0.002 (0.016)	0.120*** (0.045)
Price competition	0.021 (0.046)	0.011 (0.044)	0.016 (0.028)	−0.009 (0.016)	0.008 (0.044)
Non price competition	−0.027 (0.045)	−0.039 (0.042)	0.015 (0.027)	−0.018 (0.018)	0.012 (0.041)
Investment intensity	0.003 (0.010)	0.003 (0.009)	0.016*** (0.007)	−0.001 (0.004)	0.005 (0.009)
Tertiary share	0.000 (0.001)	0.000 (0.001)	−0.000 (0.001)	0.000 (0.000)	−0.000 (0.001)
Independent	0.004 (0.045)	0.031 (0.043)	−0.033 (0.030)	0.016 (0.014)	−0.000 (0.042)
Firm size	0.020 (0.014)	0.009 (0.014)	−0.001 (0.009)	0.012* (0.007)	0.013 (0.013)
High tech manufacturing	1.358*** (0.114)	1.222*** (0.111)	0.508*** (0.098)	0.247*** (0.072)	1.217*** (0.112)
Low tech manufacturing	1.167*** (0.113)	1.040*** (0.111)	0.369*** (0.087)	0.211*** (0.065)	1.032*** (0.111)
Modern services	1.173*** (0.111)	1.046*** (0.108)	0.400*** (0.084)	0.173*** (0.056)	1.028*** (0.105)
Traditional services	1.214*** (0.106)	1.021*** (0.103)	0.410*** (0.083)	0.200*** (0.062)	1.065*** (0.103)
<i>N</i>	300	295	260	296	302
Wald χ^2	1218.32***	816.94***	702.49***	381.84***	1036.11***

Table 6 continued

Dependent variable	Innovation performance I	Innovation performance II	R&D intensity	Patent applications	New product share
Pseudo R^2	0.19	0.20	0.20	0.22	0.22

See Table 4 for the variable definitions; standard errors are in parentheses under the coefficients; the variable *total integration* is not included in the R&D model as it predicts the failure perfectly

***, **, * denote statistical significance at the 1, 5 and 10 % test levels, respectively

such as capital intensity and human capital intensity. Only a few of the control variables have a statistically significant effect on the M&A performance. Demand development, innovation activities (only included in the economic performance equation), and independence of the firm are the three exceptions with respect to the estimates for economic performance. These variables correlate positively with economic M&A performance. Demand development is also positively correlated with the innovation variable (column 5 in Table 6) and investment intensity with R&D intensity (column 3 in Table 6).

Finally, we also examined possible size effects, for example differences between small (less than 50 employees) and medium-sized and large firms (50 employees and more) in our sample. To this end, we estimated the economic performance and the innovation equation separately for small and medium-sized and large firms (Table 10 in the appendix). With respect to economic performance, these results yield some additional insights. The effect of full integration is stronger for small firms. Firm independence and innovation activities are more important for larger firms. Non-price competition seems to be positively correlated with economic performance for small firms but negatively for larger ones. Such a difference may indicate different market environments of small and larger firms. With respect to innovation, the effects for substitutive and complementary effects of technology-relatedness that were found for all firms can be clearly traced back to larger firms. On the contrary, the difference as to effect of internal and external acquisitions is more relevant for small firms, similarly to the full integration effect for economic performance already mentioned above.

5.2 Extended model

Estimation results for the model extension are presented in Table 7. The inclusion of additional variables

for motives and obstacles does not affect the results of the basic variables. We find that innovation performance is positively correlated with innovation-specific and market-specific motives, economic performance with market- and cost-related motives. The effect of market-specific motives on economic performance is larger than the effect on innovation performance.

Only the variable for lack of proximity and organizational obstacles, a factor that is often considered as a main determinant of M&A failure, shows the expected negative effect on economic performance. Neither types of obstacles show any effect on innovation performance.

6 Summary and conclusions

Firms from the service sector were involved in about 65 % of the M&As that existed in Switzerland in the period 2006–2008, with 8 % construction firms and about 27 % manufacturing firms. About 86 % of the acquiring firms had less than 500 employees, and 60 % of them even fewer than 100 employees. For one-third of the acquiring firms, the acquired entity amounted to 25–100 % of their size as measured by annual sales. For the other two-thirds, the relative size of the acquired firms was less than 25 %. In only 5 cases (about 1 % of all M&As), the acquired entity was larger than the acquiring firm.

Most of the acquiring firms reported an increase of sales and/or market share as a consequence of M&A (53 and 63 %, respectively). Only 2–3 % of the firms recorded a decrease and the rest could not detect any impact (44 and 34 %, respectively). The outcomes with respect to profitability are slightly different. Almost 10 % of the firms reported a decrease of profitability and about 45 % either no change or an increase. The situation is quite different with respect to innovation performance. For all three innovation indicators, the dominant result was that no effect

Table 7 Probit estimates of M&A performance; model extension including motives and obstacles (average marginal effects)

Dependent variable	Economic performance II	Innovation performance II
M&A synergy		
Relative size	0.075*** (0.018)	0.046*** (0.017)
Total integration	0.120* (0.067)	0.201*** (0.075)
Substitutive technologies	0.005 (0.052)	-0.116** (0.046)
Complementary technologies	-0.032 (0.051)	0.039 (0.046)
Market related	0.007 (0.056)	-0.108** (0.053)
Internal acquisition	-0.133** (0.051)	0.001 (0.050)
Other M&A characteristics		
Integration date	0.001 (0.003)	-0.003 (0.002)
Equity financed	0.054 (0.071)	-0.195*** (0.056)
Control variables		
Demand development	0.058 (0.048)	0.041 (0.044)
Price competition	0.056 (0.047)	-0.001 (0.043)
Non price competition	-0.024 (0.045)	-0.022 (0.041)
Investment intensity	0.003 (0.009)	0.002 (0.009)
Tertiary share	0.000 (0.001)	-0.000 (0.001)
Innovation activities	0.137*** (0.049)	
Independent	0.051 (0.045)	0.042 (0.043)
Firm size	0.012 (0.014)	0.006 (0.015)
High tech manufacturing	-0.121 (0.105)	1.126*** (0.105)
Low tech manufacturing	-0.100 (0.095)	0.980*** (0.105)
Modern services	-0.011 (0.087)	0.985*** (0.100)

Table 7 continued

Dependent variable	Economic performance II	Innovation performance II
Traditional services	-0.046 (0.088)	0.961*** (0.101)
Motives		
Innovation motive	-0.009 (0.025)	0.064*** (0.019)
Market motive	0.073*** (0.026)	0.051** (0.024)
Cost motive	0.098*** (0.024)	-0.005 (0.023)
Obstacles		
Proximity organizational obstacle	-0.044* (0.026)	0.018 (0.022)
Financial obstacle	-0.007 (0.021)	0.010 (0.021)
<i>N</i>	310	289
Wald chi ²	80.92***	931.10***
Pseudo <i>R</i> ²	0.22	0.26

See Table 4 for the variable definitions; standard errors are in parentheses under the coefficients

***, **, * denote statistical significance at the 1, 5 and 10 % test levels, respectively

could be traced back to M&A (73–91 %). Less than 10 % reported a decrease but even fewer an increase, with the exception of “sales share of new products”.

Based on the firms' own assessments of six indicators of economic and innovation performance effects of the M&As, we investigated the factors that appear to correlate with high M&A performance. To this end, the performance measures are regressed on a series of possible determining factors as postulated in existing theoretical and empirical literature.

M&A performance is primarily affected by specific M&A characteristics, but not by general market characteristics such as demand development or competition conditions. Rather astonishingly, it is also not affected by firm characteristics such as capital intensity, human capital endowment, and firm size. There is an interesting exception: innovation activities. This means that, with the remarkable exception of innovation activities, the level of M&A performance is determined primarily by factors of the M&A process itself.

Both performance measures correlate positively with relative size. The larger the acquired entity, the larger is the synergy potential that can be exploited and, according to the firms' assessment, had been effectively exploited. A further condition that enables the acquiring firm to benefit from the synergy potential of M&A is a high degree of integration of the acquired firm in the new structure. A further important factor is the relatedness of acquiring and acquired entity with respect (1) to products and (2) to innovation activities. Internal acquisitions appear to have a significantly lower synergy potential than external acquisitions with respect to economic performance. Market-relatedness matters, negatively as expected, only for innovative performance. Also, technology-relatedness is an issue only for innovation performance. In this case, we found the same effect as Cassiman et al. (2005), namely that substitutive technologies do not enhance innovation performance. There is also a

positive effect of complementary technologies, but it is not statistically significant.

Contrary to theoretical expectations, equity-financed M&As do not show a superior economic performance to debt-financed ones; they even seem to be less innovative than debt-financed M&As.

Deeper insights in the differing characteristics of successful and unsuccessful M&As could be gained by a comparison of firms involved in M&As and firms that are not involved in M&As. To this end, a large sample of control firms is needed. This is a task that is to be pursued in the next future.

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Appendix

See Tables 8, 9, 10, 11 and 12.

Table 8 Descriptive statistics based on 'basic model'

Model		Economic performance		Innovation performance	
		<i>n</i> = 318		<i>n</i> = 295	
		Mean	Standard deviation	Mean	Standard deviation
Dependent variables					
Economic performance	Binary	0.708	0.455		
Innovation performance	Binary			0.210	0.408
Independent variables					
M&A synergy					
Relative size	Continuous	2.498	1.329	2.489	1.331
Total integration	Binary	0.875	0.332	0.871	0.336
Substitutive technologies	Binary	0.586	0.493	0.583	0.494
Complementary technologies	Binary	0.357	0.480	0.359	0.481
Market related	Binary	0.389	0.488	0.383	0.487
Internal acquisition	Binary	0.524	0.500	0.525	0.500
Other M&A characteristics					
Integration date	Continuous	20.284	9.275	20.211	9.269
Equity financed	Binary	0.868	0.339	0.881	0.324
Control variables					
Demand development	Binary	0.398	0.490	0.400	0.491
Price competition	Binary	0.643	0.480	0.637	0.482
Non-price competition	Binary	0.404	0.492	0.400	0.491
Investment intensity	Continuous	8.681	2.276	8.683	2.279
Tertiary share	Continuous	32.189	28.290	33.049	28.714
Innovation activities	Binary	0.503	0.501		

Table 8 continued

Model		Economic performance		Innovation performance	
		$n = 318$		$n = 295$	
		Mean	Standard deviation	Mean	Standard deviation
Independent	Binary	0.433	0.496	0.420	0.494
Firm size	Continuous	4.273	1.813	4.260	1.823
High tech manufacturing	Binary	0.122	0.328	0.129	0.336
Low tech manufacturing	Binary	0.144	0.352	0.156	0.363
Modern services	Binary	0.323	0.468	0.325	0.469
Traditional services	Binary	0.332	0.472	0.322	0.468

Table 9 Correlation matrix (based on 'basic model' of the economic performance equation; $n = 318$)

	Relative size	Total integration	Substitutive technologies	Complementary technologies	Market related	Internal acquisition
Total integration	0.068					
Substitutive technologies	0.124	0.077				
Complementary technologies	-0.017	0.097	0.248			
Market related	0.189	0.122	0.394	0.242		
Internal acquisition	0.011	0.220	0.087	0.153	0.128	
Integration date	0.117	-0.021	0.009	0.014	-0.123	-0.020
Equity financed	-0.115	0.081	-0.043	-0.021	-0.012	0.168
Demand development	-0.009	0.107	0.038	0.070	0.077	0.101
Price competition	0.001	0.040	0.067	0.034	0.114	-0.041
Non-price competition	0.035	0.036	0.028	0.016	0.049	0.042
Investment intensity	-0.032	-0.037	0.114	0.033	0.198	-0.061
Tertiary share	-0.034	0.043	-0.141	0.039	-0.096	0.097
Innovation activities	-0.099	-0.065	-0.065	0.068	-0.095	-0.076
Independent	-0.075	-0.043	-0.020	0.018	-0.019	-0.050
Firm size	-0.261	-0.209	0.107	0.009	-0.116	-0.236
High tech manufacturing	-0.016	-0.065	0.001	-0.017	-0.102	0.048
Low tech manufacturing	0.042	-0.119	-0.001	-0.025	-0.054	-0.110
Modern services	-0.025	0.052	0.028	0.095	0.100	0.060
Traditional services	0.056	0.041	-0.099	-0.107	0.009	-0.036
	Integration date	Equity financed	Demand development	Price competition	Non price competition	Investment intensity
Equity financed	-0.076					
Demand development	-0.075	0.088				
Price competition	0.008	-0.021	-0.065			
Non-price competition	-0.089	0.020	-0.041	-0.037		
Investment intensity	0.046	-0.055	0.119	-0.025	-0.047	
Tertiary share	0.082	-0.020	-0.071	-0.143	0.018	-0.046
Innovation activities	0.004	-0.072	0.124	-0.022	0.065	0.099

Table 9 continued

	Integration date	Equity financed	Demand development	Price competition	Non price competition	Investment intensity	
Independent	0.019	0.002	0.009	−0.091	−0.007	0.059	
Firm size	−0.034	0.023	−0.042	0.094	−0.031	0.153	
High tech manufacturing	−0.058	0.061	−0.087	−0.020	0.043	−0.010	
Low tech manufacturing	0.000	−0.077	−0.004	0.028	0.006	0.069	
Modern services	−0.053	−0.030	−0.006	−0.076	−0.005	−0.052	
Traditional services	0.143	−0.020	−0.014	0.028	−0.027	0.015	
	Tertiary share	Innovation activities	Independent	Firm size	High tech manufacturing	Low tech manufacturing	Modern services
Innovation activities	0.107						
Independent	−0.096	0.052					
Firm size	−0.170	0.233	0.148				
High tech manufacturing	−0.009	0.237	0.004	0.075			
Low tech manufacturing	−0.159	0.033	0.039	0.123	−0.154		
Modern services	0.334	−0.031	0.001	−0.050	−0.257	−0.283	
Traditional services	−0.124	−0.031	−0.036	−0.123	−0.264	−0.291	−0.486

Table 10 Probit estimates of M&A performance for different size classes; basic model (average marginal effects)

Dependent variable	Economic performance II		Innovation performance II	
	Small	Medium/large	Small	Medium/large
M&A synergy				
Relative size	0.104*** (0.023)	0.102*** (0.025)	0.095*** (0.024)	0.042* (0.024)
Total integration	0.449*** (0.102)	0.094 (0.081)	0.126 (0.138)	0.247*** (0.091)
Substitutive technologies	0.069 (0.087)	0.015 (0.064)	0.081 (0.074)	−0.196*** (0.053)
Complementary technologies	0.020 (0.080)	−0.041 (0.065)	−0.018 (0.071)	0.113** (0.055)
Market related	−0.014 (0.084)	−0.008 (0.073)	−0.184** (0.074)	−0.114* (0.067)
Internal acquisition	−0.232*** (0.076)	−0.127** (0.062)	−0.103* (0.061)	−0.022 (0.060)
Other M&A characteristics				
Integration date	−0.001 (0.003)	0.000 (0.004)	−0.003 (0.003)	0.000 (0.003)
Equity financed	0.023 (0.095)	0.056 (0.091)	−0.164* (0.077)	−0.298*** (0.076)
Control variables				
Demand development	−0.002 (0.069)	0.096 (0.063)	−0.059 (0.070)	0.067 (0.056)

Table 10 continued

Dependent variable Size class	Economic performance II		Innovation performance II	
	Small	Medium/large	Small	Medium/large
Price competition	0.101 (0.072)	0.049 (0.063)	−0.065 (0.059)	0.048 (0.056)
Non price competition	0.143* (0.073)	−0.123** (0.057)	−0.062 (0.061)	−0.010 (0.055)
Investment intensity	0.016 (0.011)	−0.011 (0.017)	0.006 (0.009)	0.003 (0.016)
Tertiary share	−0.000 (0.001)	−0.000 (0.001)	−0.002 (0.001)	0.002 (0.001)
Innovation activities	0.068 (0.074)	0.119* (0.069)		
Independent	0.063 (0.070)	0.117* (0.060)	0.060 (0.063)	−0.005 (0.054)
Firm size	0.026 (0.033)	0.025 (0.028)	−0.038 (0.031)	−0.014 (0.028)
High tech manufacturing	−0.003 (0.179)	−0.139 (0.140)	1.123*** (0.177)	1.151*** (0.137)
Low tech manufacturing	0.036 (0.143)	−0.104 (0.133)	1.012*** (0.169)	0.950*** (0.143)
Modern services	0.032 (0.124)	0.030 (0.129)	0.993*** (0.154)	0.873*** (0.136)
Traditional services	0.075 (0.123)	−0.019 (0.127)	0.928*** (0.150)	0.954*** (0.139)
<i>N</i>	130	188	121	174
Wald χ^2	51.47***	31.68**	520.30***	656.10***
Pseudo R^2	0.30	0.15	0.28	0.28

See Table 4 for the variable definitions; standard errors are in parentheses under the coefficients; firms with 1–49 employees are classified as small, firms with 50 or more employees as medium/large

***, **, * denote statistical significance at the 1, 5 and 10 % test levels, respectively

Table 11 Principal components factor analysis of motives for M&A (rotated factor loadings; pattern matrix); significant results in bold

	Factor 1	Factor 2	Factor 3
Motive			
Increase market share in the existing business of the acquiring firm	0.12	0.75	0.16
Broaden the product mix of the existing business of the acquiring firm	0.38	0.61	−0.03
Entry into businesses that were new to the acquirer	0.08	0.77	0.06
Spread fixed costs of production over larger output	0.10	0.01	0.80
Rationalization of procurement	0.24	0.22	0.79
Rationalization of production	0.21	−0.00	0.76
Rationalization of marketing and sales	0.16	0.23	0.74
Obtain access to specific know-how in production	0.59	0.37	0.20
Obtain access to specific know-how in distribution	0.45	0.50	0.28

Table 11 continued

	Factor 1	Factor 2	Factor 3
Obtain access to networks (customers, supplier)	0.27	0.72	0.16
Spread the market risk	0.23	0.52	0.43
Reduce costs of R&D	0.79	0.00	0.19
Obtain access to innovation related know-how	0.82	0.24	0.12
Obtain access to innovation related networks (e.g., universities)	0.79	0.21	0.12
Reduce the risks of the R&D portfolio	0.85	0.04	0.19
Reduce the risk of being imitated	0.74	0.22	0.20
Get competing technologies under control	0.70	0.25	0.13
Statistics			
Number of observations	390		
Kaiser–Meyer–Olkin measure of sampling adequacy	0.90		
Variance explained by each factor	0.27	0.18	0.17
Final communality estimate	0.62		
Characterization of the three factors based on the factor pattern			
Factor 1: innovation motive			
Factor 2: market motive			
Factor 3: cost motive			

Table 12 Principal components factor analysis of M&A obstacles (rotated factor loadings; pattern matrix); significant results in bold

	Factor 1	Factor 2
Obstacle		
Large geographical distance	0.69	0.07
Linguistic/cultural differences	0.75	0.07
Lack of synergies	0.64	0.38
Insufficient management capacity	0.79	0.19
High costs of coordination	0.76	0.26
Inconsistent objectives	0.61	0.40
Insufficient availability of internal capital	0.16	0.92
Insufficient availability of external capital	0.12	0.93
Development of the market demand	0.57	0.38
Statistics		
Number of observations	379	
Kaiser–Meyer–Olkin measure of sampling adequacy	0.83	
Variance explained by each factor	0.38	0.25
Final communality estimate	0.63	
Characterization of the two factors based on the factor pattern		
Factor 1: organizational obstacle		
Factor 2: financial obstacle		

References

- Agrawal, A., & Jaffe, J. F. (2000). The post-merger performance puzzle. In C. Cooper & A. Gregory (Eds.), *Advances in mergers and acquisitions* (pp. 1–42). Stamford, CT: JAI Press.
- Agrawal, A., Jaffe, J. F., & Mandelker, G. N. (1992). The post-merger performance of acquiring firms: A re-examination

- of an anomaly. *The Journal of Finance*, 47(4), 1605–1621.
- Bertrand, O. (2009). Effects of foreign acquisitions on R&D activity: Evidence from firm-level data for France. *Research Policy*, 38(6), 1021–1031.
- Bertrand, O., & Zuniga, M. (2006). R&D and M&A: Are cross-border M&A different? An investigation on OECD countries. *International Journal of Industrial Organization*, 24(2), 401–423.
- Bild, M. (1998). *Valuation of takeovers*. Stockholm: Economic Research Institute at the Stockholm School of Economics.
- Capron, L. (1999). The long-term performance of horizontal acquisitions. *Strategic Management Journal*, 20(11), 987–1018.
- Capron, L., Mitchell, W., & Swaminathan, A. (2001). Asset divestiture following horizontal acquisitions: A dynamic view. *Strategic Management Journal*, 22(9), 817–844.
- Cartwright, S., & Cooper, C. L. (1996). *Managing mergers, acquisitions and strategic alliances: Integrating people and cultures*. Oxford: Butterworth-Heinemann.
- Cassiman, B., Colombo, M. G., Garrone, P., & Veugelers, R. (2005). The impact of M&A on the R&D process: An empirical analysis of the role of technological- and market-relatedness. *Research Policy*, 34(2), 195–220.
- Cloodt, M., Hagedoorn, J., & Van Kranenburg, H. (2006). Mergers and acquisitions: Their effect on the innovative performance of companies in high-tech industries. *Research Policy*, 35, 642–654.
- Datta, D. K. (1991). Organizational fit and acquisition performance: Effects of post-acquisition integration. *Strategic Management Journal*, 12(4), 281–297.
- Dutta, S., & Jog, V. (2009). The long-term performance of acquiring firms: A re-examination of an anomaly. *Journal of Banking and Finance*, 33(8), 1400–1412.
- Gugler, K., Mueller, D. C., & Weichselbauer, M. (2012). The determinants of merger waves: An international perspective. *International Journal of Industrial Organization*, 30, 1–15.
- Harrison, J. S., Hitt, M. A., Hoskisson, R. E., & Ireland, R. D. (1991). Synergies and post-acquisition performance: Differences and similarities in resource allocations. *Journal of Management*, 17(1), 173–190.
- Hitt, M. A., Harrison, J. S., & Ireland, R. D. (2001). *Mergers and acquisitions: A guide to creating value for shareholders*. Oxford: Oxford University Press.
- Jensen, M. (1986). Agency costs of free cash flow, corporate finance and takeovers. *American Economic Review*, 76(2), 323–329.
- Kaplan, S. N. (2000). *Mergers and productivity*. Chicago: University of Chicago Press.
- King, D. R., Dalton, D. R., Daily, C. M., & Covin, J. G. (2004). Meta-analyses of post-acquisition performance: Indications of unidentified moderators. *Strategic Management Journal*, 25(2), 187–200.
- Laabs, J. P., & Schiereck, D. (2010). The long-term success of M&A in the automotive supply industry: Determinants of capital market performance. *Journal of Economics and Finance*, 34(1), 61–88.
- Larsson, R., & Finkelstein, S. (1999). Integrating strategic, organizational and human resource perspectives on mergers and acquisitions: A case survey of synergy realization. *Organization Science*, 10(1), 1–26.
- Long, W. F., & Ravenscraft, D. J. (1993). LBOs, debt and R&D intensity. *Strategic Management Journal*, 14(1), 119–135.
- Lubatkin, M. (1983). Mergers and the performance of the acquiring firm. *The Academy of Management Review*, 8(2), 218–225.
- Martynova, M., & Renneboog, L. (2008). A century of corporate takeovers: What have we learned and where do we stand? *Journal of Banking and Finance*, 32, 2148–2177.
- McDonald, M. L., Westphal, J. D., & Graebner, M. E. (2008). What do they know? The effects of outside director acquisition experience on firm acquisition performance. *Strategic Management Journal*, 29(11), 1155–1177.
- Meglio, O., & Risberg, A. (2011). The (mis)measurement of M&A performance—A systematic narrative literature review. *Scandinavian Journal of Management*, 27(4), 418–433.
- Seth, A. (1990). Value creation in acquisitions: A re-examination of performance issues. *Strategic Management Journal*, 11(2), 99–115.
- Sharma, D. S., & Ho, J. (2002). The impact of acquisitions on operating performance: Some Australian evidence. *Journal of Business Finance and Accounting*, 29(1), 155–200.
- Singh, H., & Montgomery, C. A. (1987). Corporate acquisition strategies and economic performance. *Strategic Management Journal*, 8(4), 377–386.
- Stahl, G. K., & Voigt, A. (2004). Impact of cultural differences on merger and acquisition performance a critical research review and integrative model. *Advances in Mergers and Acquisitions*, 4, 51–82.
- Teerikangas, S., & Very, P. (2006). The culture-performance relationship in M&A: From yes/no to how. *British Journal of Management*, 17(1), S31–S48.
- Veugelers, R. (2005). M&A and innovation: A literature review. In B. Cassiman & M. Colombo (Eds.), *Mergers and acquisitions: The innovation impact* (pp. 37–62). Cheltenham: Edward Elgar.
- Weitzel, U., & McCarthy, K. J. (2011). Theory and evidence on mergers and acquisitions by small and medium Enterprises. *International Journal of Entrepreneurship and Innovation Management*, 14(2/3), 248–275.